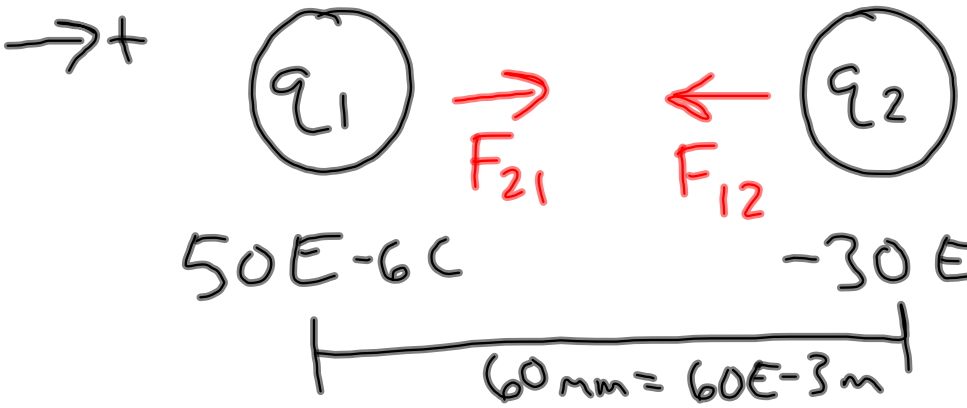
Practice Problems and Circuit Notes 5.8.12 Honors Physics

Two charged particles are brought near to each other. Charge 1 has a value of 50 microC (50E-6 C), charge 2 has a value of -30 microC (30E-6), and they are separated by 60 mm. What is the force that each exerts on the other?

micro → M → 10^{-6}

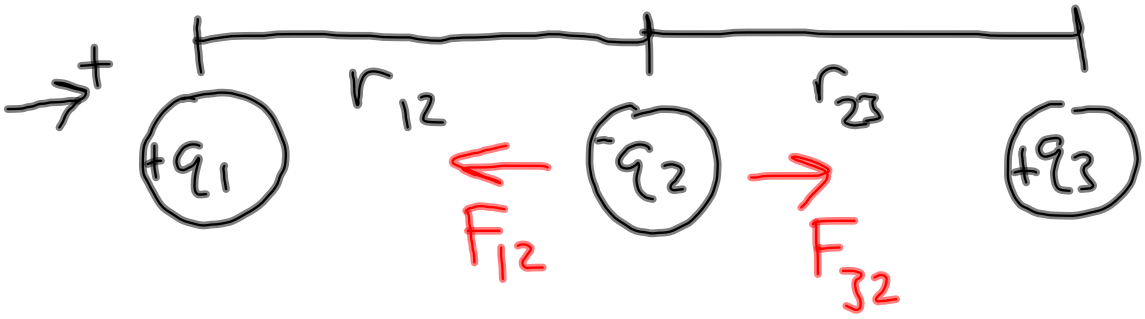


force is attractive because the + and −

$$F_{21} = \frac{k|q_1||q_2|}{r_{12}^2}$$

$$= \frac{(8.99E9\ N\cdot m^2/C^2)(50E\text{-}6C)(30E\text{-}6C)}{(60E\text{-}3m)^2}$$

$$= 3745\ N$$

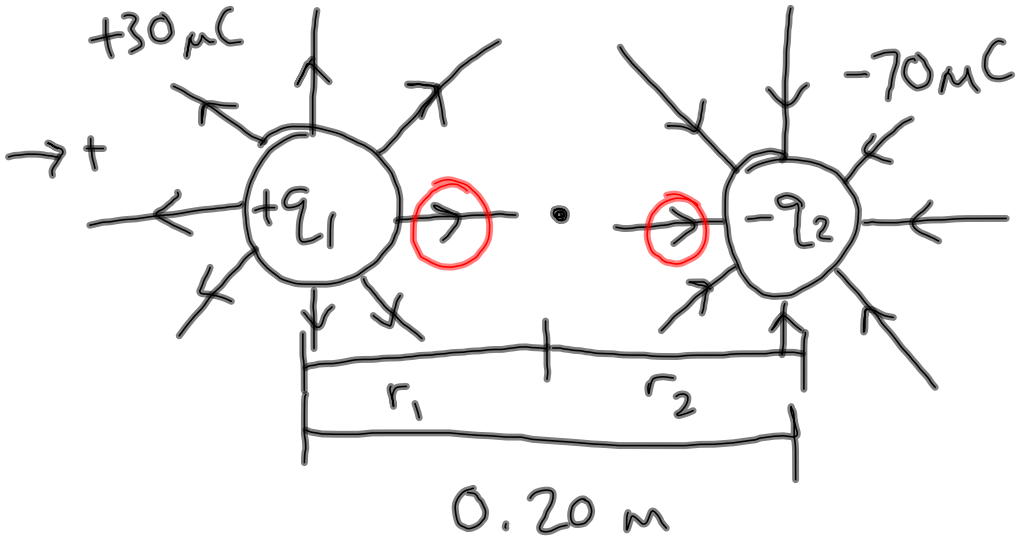


find net force on q_2

$$\sum \overline{F} = \overline{F}_{12} + \overline{F}_{32}$$

$$= \frac{-k|q_1||q_2|}{r_{12}^2} + \frac{k|q_3||q_2|}{r_{23}^2}$$

Two charges are separated by a distance of 20 cm, and there is a point halfway between them at which we want to measure the electric field. If one charge is +30 microC and the other charge is -70 microC, what is the net electric field at the point?



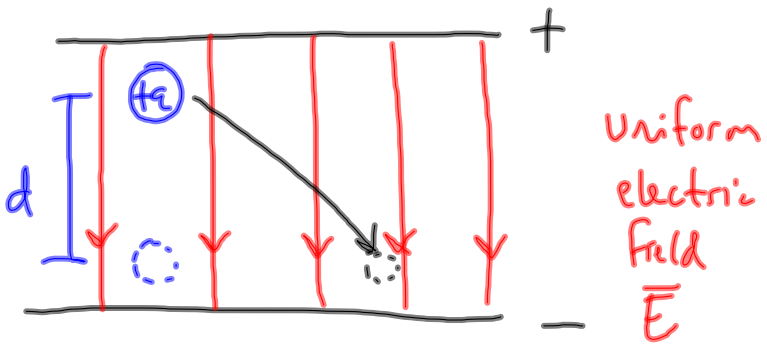
$$\Sigma \vec{E} = \vec{E}_1 + \vec{E}_2$$

$$= \frac{+k|q_1|}{r_1^2} + \frac{+k|q_2|}{r_2^2}$$

$$N \cdot m^2/C^2 = \frac{k(30E\text{-}6\ C)}{(.10\ m)^2} + \frac{k(70E\text{-}6\ C)}{(.10\ m)^2}$$

$$= 8.99E7\ N/C$$

- Electric Potential Energy:



$$\Delta U_e = -qEd$$

- ΔU_e: change in electric potential energy
- q: charge
- E: electric field
- d: displacement

– the only displacement that matters is displacement in the direction of the electric field.

- Electric potential difference

(Potential, Potential difference, Voltage)

$$\Delta V = \frac{\Delta U_e}{q} = \frac{-qEd}{q} = -Ed$$

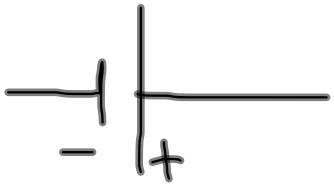
Units: Volts $1V = 1J/C$

- Current:
  - flow of electrons
  - $I = \frac{\Delta q}{\Delta t}$ → amount of charge; → amount of time
    → current
  - Units: Amperes $1\ A = 1\ \frac{C}{s}$

- Resistance:
  - Amount that a material impedes the flow of electrons
  - Measured in Ohms (Ω)

- Circuits:
  - Common pieces:

Wire 

Battery 

Resistor

  - Schematic is a representation of a physical connection.